

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION FOR UNITED STATES PATENT

METHOD AND SYSTEM FOR RELEASING A PLUGGABLE MODULE

INVENTORS

Harold Y. Walker, Jr.
203 Starlite
Plano, TX 75094

Richard L. Bell
2106 Sky Ridge Creek
Richardson, TX 75082

EXPRESS MAIL NO.: EL597435721US

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The present invention generally relates to modules for use in fiber
5 optic and transceiver systems. The present invention also relates to
pluggable modules that may be utilized in such transceiver systems. The
present invention also relates to transceiver modules and methods and
systems for releasing such modules from transceiver systems in which
modules are mounted closely to one another.

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BACKGROUND OF THE INVENTION

Optoelectronic transceiver modules provide for the bi-directional transmission of data between electrical interfaces and optical data links. Such a module generally can receive electrically encoded data signals for conversion into optical signals, which can then be transmitted over the optical data link. Likewise, such a module can receive optically encoded data signal, which can then be converted into electrical signals and transmitted onto an electrical interface.

Other types of transceiver modules can also be utilized to transmit data. Infrared transceivers, for example, can be utilized for a number of data communication applications. For example, infrared transceiver modules can be utilized to couple laptop computers and personal information managers (PIMs) to IR ports or printers. Also, an increasing number of portable and PIM systems include IR transceiver modules to provide inter-computer and inter-PIM data transfers.

An IR transceiver module typically includes an IR PIN (p-intrinsic-n) diode for a sensor, and an IR light emitting diode (LED) as an emitter. Associated with the sensor is receiver circuitry, and associated with the emitter is transmission circuitry. When the receiver circuitry and transmitter circuitry are integrated together on an integrated circuit (IC), the circuitry can be referred to as a "transceiver" IC or, simply, a "transceiver."

While the sensor, emitter and transceiver of an IR transceiver system can be provided as separate components, it is often desirable to have these components combined into a single package or "module" to save space. Such IR transceiver modules are well known and are commercially available from a number of sources. By combining the various components of the IR transceiver system into a single module, the size or "form factor" of the system can be reduced considerably. Additionally, such modules tend to be more durable and often consume less power than equivalent structures

formed with the discrete components.

5 A transceiver module may be mounted onto one or more circuit card assemblies of a host computer, input/output system, peripheral device, or switch. Therefore, as with all electronic equipment there is a need for a transceiver module having an outer package design which occupies as little circuit card surface area as possible. One of the problems with such designs, however, is the fact that many modules are often required to be utilized in such devices and transceiver systems. In scenarios in which a
10 variety of modules are placed in close proximity to one another, this presents additional difficulties.

15 Based on the foregoing, the present inventors have concluded that a need exists for a pluggable module that can be efficiently plugged into and removed from transceiver systems that require the use of a number of closely packed modules. The present invention thus meets and addresses this need.

BRIEF SUMMARY OF THE INVENTION

The following summary of the invention is provided to facilitate an understanding of some of the innovative features unique to the present invention, and is not intended to be a full description. A full appreciation of the various aspects of the invention can be gained by taking the entire specification, claims, drawings, and abstract as a whole.

It is therefore one aspect of the present invention to provide an improved transceiver module.

It is therefore another aspect of the present invention to provide an improved pluggable module for use in transceiver and other systems.

It is another aspect of the present invention to provide a method and system for releasing a module from a transceiver system that includes a plurality of modules in proximity to one another.

It is yet another aspect of the present invention to provide a pluggable module having an ejector button formed from molded plastic or other rigid material.

It is still another aspect of the present invention to provide a pluggable module having a release handle, which can be formed from wire.

The above and other aspects are achieved as is now described. A method and system is disclosed for releasing a module utilized in a transceiver system that includes a plurality of modules in close proximity with one another. The module is generally configured to include a handle with an associated cam formed in a first section of the module. The handle can be pulled in a downward (or upward) direction to allow the cam to move an associated ejector button integrated with the module in order to

release the module from the transceiver system, thereby permitting the module to be efficiently removed from the transceiver system. The module is thus removable from the transceiver system utilizing the handle. The module is locked into the transceiver system when the handle is placed in an upward position. The handle itself may comprise a wire handle, which can be formed from steel wire. The ejector button may be configured from molded plastic or other rigid material. The module itself generally comprises a pluggable module, which can be plugged into and removed from the transceiver system. Such a module can comprise a small form-factor pluggable transceiver module for use in association with the transceiver system.

The method and system for removing a module, as indicated herein, thus utilizes a small wire handle with a cam formed in one section and a modified ejector button. When the handle is placed in an up position, the module is locked into place. When the handle is pulled down (or opposite its lock position), the cam moves the ejector button, which releases the module. The handle can then be utilized to pull the module away from the transceiver system or other associated system into which it had previously plugged.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying figures, in which like reference numerals refer to identical or functionally-similar elements throughout the separate views and which are incorporated in and form part of the specification, further illustrate the present invention and, together with the detailed description of the invention, serve to explain the principles of the present invention.

FIG. 1 depicts a perspective pictorial view of a pluggable module having a handle thereof in an upward position, in accordance with a preferred embodiment of the present invention;

FIG. 2 illustrates a perspective pictorial view of a pluggable module having a handle thereof in a downward position, in accordance with a preferred embodiment of the present invention;

FIG. 3 depicts a top view of a pluggable module having a handle thereof in an upward position, in accordance with a preferred embodiment of the present invention;

FIG. 4 illustrates a side view of a pluggable module having a handle thereof in an upward position, in accordance with a preferred embodiment of the present invention;

FIG. 5 depicts a bottom view of a pluggable module having a handle thereof in an upward position, in accordance with a preferred embodiment of the present invention;

FIG. 6 illustrates a sectional view of a pluggable module having a handle thereof in an upward position, in accordance with a preferred embodiment of the present invention;

FIG. 7 depicts a top view of a pluggable module having a handle thereof in a downward position, in accordance with a preferred embodiment of the present invention;

5 FIG. 8 illustrates a side view of a pluggable module having a handle thereof in a downward position, in accordance with a preferred embodiment of the present invention;

10 FIG. 9 depicts a bottom view of a pluggable module having a handle thereof in a downward position, in accordance with a preferred embodiment of the present invention; and

15 FIG. 10 illustrates a sectional view of a pluggable module having a handle thereof in a downward position, in accordance with a preferred embodiment of the present invention.

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DETAILED DESCRIPTION OF THE INVENTION

The particular values and configurations discussed in these non-limiting examples can be varied and are cited merely to illustrate embodiments of the present invention and are not intended to limit the scope of the invention.

FIG. 1 depicts a perspective view of a pluggable module 10 having a handle 28 thereof in an upward position 12, in accordance with a preferred embodiment of the present invention. Pluggable module 10 can thus be generally configured to include a handle 28 with an associated cam 21 formed in a first section 13 of pluggable module 10. First section 13 is illustrated in FIG. 1 and 2 between dashed lines 17 and 19. Handle 28 can be pulled in a downward direction to allow movement of an associated ejector button (i.e., illustrated in FIGS. 6 and 10) integrated with pluggable module 10 in order to release pluggable module 10 from the transceiver system.

Pluggable module 10 can thus be removed from the transceiver system utilizing handle 28. Pluggable module 10 is locked into the transceiver system when handle 28 is placed in an upward position 14, as illustrated in FIG. 2. Handle 28 may be configured from a wire handle, which can be formed from steel wire or other rigid or semi-rigid material. The ejector button (i.e., see FIGS. 6 and 10) may be configured from molded plastic or other rigid or semi-rigid material. FIG. 2 illustrates a perspective view of pluggable module 10 having handle 28 thereof in a downward position 14, in accordance with a preferred embodiment of the present invention.

Note that in FIGS. 1 to 10, analogous or like parts are indicated by identical reference numerals. Thus, FIGS. 1 to 10 are jointly illustrated herein to provide varying views of pluggable module 10. FIG. 3 depicts a top view 16 of pluggable module 10 having handle 28 thereof in an upward

position 12, in accordance with a preferred embodiment of the present invention. FIG. 4 illustrates a side view 18 of pluggable module 10 having handle 28 thereof in an upward position 12, in accordance with a preferred embodiment of the present invention. FIG. 5 depicts a bottom view 20 of pluggable module 10 having handle 28 thereof in an upward position 12, in accordance with a preferred embodiment of the present invention. FIG. 6 illustrates a sectional view 30 of pluggable module 10 having handle 28 thereof in an upward position 12, in accordance with a preferred embodiment of the present invention. Sectional view 30 of FIG. 6 additionally illustrates an ejector button 22, a locking tab 24 positioned on a cage of pluggable module 10 and a protection housing 26.

FIG. 7 depicts a top view 36 of pluggable module 10 having a handle thereof in a downward position 14, in accordance with a preferred embodiment of the present invention. FIG. 8 illustrates a side view 38 of pluggable module 10 having handle 28 thereof in a downward position 14, in accordance with a preferred embodiment of the present invention. FIG. 9 depicts a bottom view 40 of pluggable module 10 having handle 28 thereof in a downward position 14, in accordance with a preferred embodiment of the present invention.

FIG. 10 illustrates a sectional view 40 of pluggable 10 module having handle 28 thereof in a downward position 14, in accordance with a preferred embodiment of the present invention. The method and system for removing a module, such as pluggable module 10, as indicated herein, thus utilizes a small wire handle 28 with a cam formed in one section and a modified ejector button 22. When handle 28 is placed in an upward position 14 as indicated, for example, in FIG. 9 the module is locked into place. When the handle is pulled down, the cam moves the ejector button, which releases the module. Handle 28 can then be utilized to pull the module away from the transceiver system or other associated system into which it was previously plugged.

Pluggable module 10 can be configured as a transceiver module for use in a transceiver system or associated systems thereof. Such a transceiver module may be configured as an optoelectronic transceiver module, such as, for example, an infrared (IR) transceiver. Pluggable module 10 can include an emitter (not illustrated), which can be configured from a small laser.

Such a small laser may be, for example, a VCSEL (Vertical Cavity Surface Emitting Laser). A VCSEL is a type of laser device that emits light in a single direction through an upper structure of the laser structure. VCSEL devices thus generally combine the performance advantage of LEDs and lasers at costs comparable to LED solutions. Traditional semiconductor lasers, such as the ones utilized in CD players, emit light from edge of the chip, so it is necessary to cleave a wafer into chips and package the chip before knowing of the laser is good. VCSELs emit light vertically from the wafer surface, like LEDs, which means their fabrication and testing is fully compatible with standard integrated circuit procedures and equipment. VCSELs, however, are much faster and more efficient and produce a smaller divergence beam than LEDs. Pluggable module 10 can thus be configured as a transceiver module based on a VCSEL laser, which produces a beam, that projects light in a collimated fashion.

The embodiments and examples set forth herein are presented to best explain the present invention and its practical application and to thereby enable those skilled in the art to make and utilize the invention. Those skilled in the art, however, will recognize that the foregoing description and examples have been presented for the purpose of illustration and example only. Other variations and modifications of the present invention will be apparent to those of skill in the art, and it is the intent of the appended claims that such variations and modifications be covered. The description as set forth is not intended to be exhaustive or to limit the scope of the invention.

Many modifications and variations are possible in light of the above teaching without departing from scope of the following claims. It is contemplated that the use of the present invention can involve components having different characteristics. It is intended that the scope of the present invention be defined by the claims appended hereto, giving full cognizance to equivalents in all respects.

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